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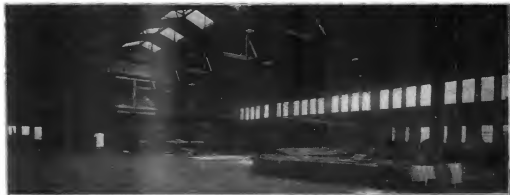
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Aircraft vs. Capital Ships

THE following remarkable discussion of aircraft versus battleships was sent to *Aviation and Aircraft Journal* by C. O. Greer, the distinguished editor of *The Aeroplane*. It was written on January 14, before General Kirtland's statement on the same subject was made in Washington.

I am glad to see that you are interested in the subject of Aerial versus Capital Ships. Briefly, my personal opinion is that the capital ship of the future will be a very big high-speed aircraft-carrier which will use torpedoes and planes instead of long range guns and otherwise will be compared with what is now considered secondary armament for our present battle ships and against submarines. She will also have to carry battleship armament to repel torpedo destroyers.

Both dropping against ships is harmless as compared with torpedoes dropped. That of the number of arms which a battle shipper can make. A torpedo shipper, on the other hand, has not to worry about surface vessels but has to worry about the water. The speed of the airplane hardly matters in the least, as the only thing the pilot has to think about is the speed of the vessel which he is going to torpedo and the distance she will cover in the time the torpedo will take to reach her. And, as he probably has 300 feet of ship for target, he has a pretty wide margin for error. Big guns on ships are now practically useless because their range is limited not by the gun but by the human eye, to the curve of the earth (i. e., the horizon), and by the atmosphere's turbidity, prevailing at the moment.

Just from that, the aerial plane is not doing about the worst manner in the world. I think it is pretty generally admitted that the shooting of the U. S. Navy was not as good as ours, and ours was certainly not as good as the German. If the German had had a fleet of 10 or 15 per cent as big as ours at Jutland they would surely have blown us out of the water on shore support matters.

Even so, British naval gunnery is not bad as naval gunnery goes, but compared with the army, anti-aircraft gunnery is simply dead and dumb. The naval gunner positively knows nothing of the elements of modern scientific artillery work as understood by the field artillery, or the aviation gunner. Still we don't know anything about the completely new science of aerial gunnery as developed by our own aircraft gunners in the London Air Defense Area during the war. Consequently the science the Navy's guns are taken away from it and replaced in northern France by people who do have something about their job the better for the air.

What is really at the bottom of the bad aerial gunnery is the fact that the naval gunner shoots at ships and is a target as the army's and consequently naturally by nature. The army artilleryman has to shoot at targets anywhere above him or below him and as often as not has to fire by the map without seeing what he is firing at all. That is why the army is more accurate.

Finally, against aerial aviation, did you see the statement that in an attack by, I think it was right, airplanes carrying incendiaries on the British fleet southeast of Portland Roads the airplanes scored six direct hits, most of which would certainly have sunk the ship and at any rate would have put it completely out of action. The airplane came over from Choptank near Frenchtown, proceeded by two bombers which flew at about 10,000 feet where, of course, the flat-topped sailor man never heard nor saw them. Instead of dropping bombs the bombers dropped a string of torch-bombs about a mile to

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wardward of the fleet. Before the smoke cleared away and before the fleet had a chance to see a gun, the torpedoes had been sent through the smoke screen and about 150 miles or less, so low down and so fast that no earthly naval gun could have had a chance of hitting any of them. It is practically certain that given an adequate form of torpedoes aircraft or battle fleet could get within 100 miles of any point so defended.

Aircraft Union Stations

THE establishment of a flying field in Los Angeles for one of all aircraft companies operating airplanes in the vicinity is the beginning of a logical development that will spread to all cities as commercial aviation develops. Probably the greatest standing block in the way of aviation progress is the lack of ground operations in all its branches. If a company is required to buy and equip every flying field that it needs to run an service the proposition becomes too big for any ordinary corporation to handle. In addition, after that company is in operation, a second company may wish to serve some of the same cities. This second company would be forced to either pay a high rent to a competitor or establish another field of its own. Preventing two fields where one would serve as an economic waste.

Flying fields should logically be established and maintained by the state or municipality in the same manner that land and water highways are now maintained, without perpetrating private monopolies. This has been the policy of the Air Mail so far as possible. Many municipal fields have been established to attract the mail. The reason for public flying fields lies in the fact that it is of permanent interest to the state that flying fields be established all over the country for reasons of national defense and commercial advancement.

The prevention of proper and uniform national regulations governing the operation of aircraft is also essential. Flying fields are importantly needed but their value would be somewhat vitiated by a lack of traffic regulations and by balancing among the users of the fields as to their respective rights due to a lack of proper control.

Air Tournaments

CALIFORNIA has pointed the way to the successful conduct of air tournaments. When the state decided to hold a tournament and one hundred thousand go to the vicinity to see a free show, it is clear evidence that air meets have an attractive value that is necessarily deserving such publicity must recognize.

The exhibition feature of such tournaments, where the public may become acquainted with various types of aircraft is helpful to the Army and Navy and deserves their encouragement.

If sufficient local support can be secured it is planned to have several such tournaments in other parts of the country this year.

Brig-Gen. Mitchell's Startling Testimony

Claims Aircraft Can Render
Big Naval Battleships Obsolete

The following testimony of Brig-Gen. William Mitchell before the House Appropriations Committee has caused national discussion of the controversy over the future of the \$145,000,000 battleship. Secretary Douglas has commented on the statements made. If General Mitchell is right of the national defense problem the sooner the country knows it, the better.

Mr. ARMY. General Mitchell, you are looked to as one of the order giving men of the United States, and you are a man of the world. It is a general way, to have your ideas of the condition of the world of the nation.

NAME, EMPLOYMENT AND RESIDENCE OF AERIAL BOMBING COMMANDER WITH R. R. ANGLADE, DIRECTOR OF AIRCRAFT RESEARCH, PLANE BUILDING, UNITED STATES OF AMERICA, OFFICE BUILDING IN NEW YORK CITY.

Percentage of Rise, 100%

Percentage of Rise, 100%

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VIEW OF AN AERIAL BOMBING ON THE DECK OF A BATTLESHIP

It will be noticed that the turret is crushed and demolished; the whole deck is swept clean, and several decks down below crushed up and damaged, the deck above blown off, and the damage extended to practically all parts of the ship.

A direct hit by an aerial bomb on a battleship will break every electric light globe on the ship, throw her ship's absolute darkness below-deck, will shatter lightning, radio, and wireless communication systems, fill the rooms, magazines, and other parts of the ship with smoke, and will cause the ship to be completely disabled. The ship will be completely disabled, the ship will be completely disabled, the ship will be completely disabled.

Indian was made to begin to sink by one bomb with only 214 pounds of explosive attached to it. But before the water sank to that level from her side, the ship was completely disabled. The ship was completely disabled, the ship was completely disabled, the ship was completely disabled.



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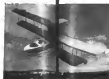
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Every wide awake pilot can make money this year. You can buy a six passenger Aeromarine Navy HS-2 Flying Boat equipped with 350 HP. low compression Liberty motor for one-third of what it would now cost to build it. Your operating cost for fuel, pilot and mechanic is \$16.00 per flying hour. Your possible revenue is from \$250.00 to \$300.00 per flying hour. This shows a handsome profit, after allowing fully for overhead and depreciation.

The Aeromarine Company has invested hundreds of thousands of dollars in successfully operating flying boats for commercial purposes. All of this valuable experience is at the disposal of companies operating Aeromarine flying boats. Organize an airline in your town. Other people are getting busy. The supply of boats is limited. Better act today. The Canadian Government last July selected one of these Navy HS-2's over all other allied aircraft to make the long flight between Cochrane and Hudson Bay.



Navy HS-2, Flying Boat (Overpowered) F. O. B. Naval Base,
Philadelphia, New York, Francisco and San Diego
Price \$61,000.00 Immediate delivery



Aeromarine Navy HS-2, Six Seat Flying Boat, Model No. 85
Price \$10,000.00 Delivery



Aeromarine Navy HS-2, Sealed Cabin Six Seat Flying Boat,
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NEW YORK CITY

ups of steel. A Thiel Glue testing machine can exert a load of 30,000 pounds pressure and take a strip $\frac{3}{8}$ by 6 inches in compression and a test specimen 6 feet 6 inches in tension. The equipment also includes a small electrical furnace from Emery & Arnold, New York, mounted on the multiple steel system so that one set of rods can be replaced without the furnace being put out of commission.

A very interesting item is a simple apparatus for experiments in fluid friction. A small Emerson turbine under a water

The wood shop has a clear floor space of about 300 x 100 feet. In connection with the wood mill a large dry kiln is in operation.

Wall Shop

The wall shop is a room 300 feet long by 80 feet wide with a head clearance of 10 feet. The floor space is entirely clear. Paint and varnish stock rooms are placed on the floor of the shop. In the upstairs galleries are the paint



THE AMERICAN HILL SHOP, THE COVERING, FORMS AND GLASS ON THE LEFT THE WOOD SHOP AND GLUE PLANT THE PLATING SHOP

which is provided at such a temperature of 300 deg F can be obtained in 30 minutes, and experiments on the heat treatment of Duralumin are easily conducted.

Wood Shop

The wood mill is particularly well and completely equipped for every kind of wood work which is likely to occur in an aircraft factory. Special plan presses are provided for laminated wood beams, as can be seen in the photograph. Some of the machines include a sawing machine from J. A. Fay & Sons Co., Cincinnati and a machine tool applying sand paper machine of the Matthews Band Papering Co., Beloit, Wis. An interesting piece of equipment is the Harrison automatic sheet shaping equipment. Stationary struts set on a revolving steel wheel, with proper cone construction, allows 300 struts a day to be shaped. The American Woodworking Machine Co., Wilkesboro, Pa., provides some of the head saws, horizontal planers and similar machines.

iron shops. Bells are built vertically on frames, which are mounted to quantity production and maintenance of manufacture.

Adjoining the hull shop is the covering department. A new room, at the end of the hull shop, has all parts and pieces cut to shape and numbered ready for assembly. The complete hull is taken out directly from the hull shop to the final assembly.

Plating Department

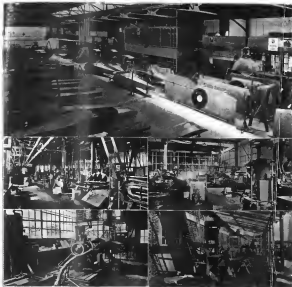
One of the most important parts of the equipment of an airplane factory is the plating room for metal parts, such as struts, metal struts, etc. The plating room of the Aeroconstruction and Metal Co. includes five baths with a maximum length of 30 feet, built solidly into the ground, where all plating can be carried out in accordance with Army and Navy specifications.

There is a self contained generator set and a switchboard allowing for fine regulation of the current. Two rotary planes, one of which is shown in the extreme left of the photograph, are supplied by Hanson and VanWinkle Co., Newark, N. J. The rotary planes are extremely efficient for small parts.

department a complete airplane governing plant is operated, which is housed in a separate fan cooled building.

Final Assembly Room

The final aircraft assembly is in a beautifully lighted ventilated and heated room some 300 feet long by 80 feet wide with a 30-



THE FINAL AIRCRAFT ASSEMBLY ROOM IN THE AEROCONSTRUCTION PLANT. MACHINE SHOP, MAJOR DEPARTMENT. MAJOR TOOL PLANTING AND ENGINE STRAIN

Welding Department

The welding department includes a barrel and blast machine, every boring machine, a dip bonning outfit, and a Thompson spot welder, used for spot welding before furnace brazing. A heat treatment furnace with a ten-foot length limit is also part of the equipment. In connection with this

final clearance to the roof (true light and heat). It carries enough galleries on three sides, which constitute storage space for finished and scrap parts, in addition to the particularly well located finished parts stock rooms shown in the back corner of the illustration.

At the end of the shop there are diving docks with 80 to 10

foot clearance, so that a machine as large as an F-5-L, can be taken out on a roller track and launched right at the factory door, making a "to-day" delivery. One could scarcely ask for a better shop for final assembly of the largest aircraft. Six of these F-5-L flying boats have already been assembled for commercial flying purposes. One is ready for delivery, one is under construction and two are contemplated. One plane of this type is equivalent to five planes of the DH type.

Propeller Department

A special propeller department is installed in the plant and all propellers are designed and built at the factory. No retreating machines are employed, all propellers are custom-built to suit exact requirements. The total tool equipment is valued.

Machine Shop and Motor Department

The machine shop equipment is necessarily large to facilitate the manufacture of the four types of motors produced by this company as is shown by the photographs illustrating it. The manufacture of most aircraft engines is done in several divisions and such a large and varied machine shop equipment is either justified or found in the average aircraft factory.

Among the equipment are a number of grinding machines of various types including a disk grinder with a grinding surface approximately five feet in diameter, manufactured by the Ohio H. Rudy Co., Columbus, Ill. A cylinder sleeve grinder built by the Federal Tool Co., Springfield, Ill. and a crankshaft grinder formerly built by the Linden Tool Co., Wayne, Pa.; also several other smaller types of machines for various uses.

Drill press equipment is particularly complete, there being a crankshaft lathe of the heavy duty type built by the H. K. & S. Blood Machine Tool Co., Cincinnati, Ohio, and other engine lathes built by the American Tool Works, Cincinnati, Ohio. Milling machines of various sizes are manufactured by the Cincinnati Milling Machine Co., Cincinnati, Ohio, Van Swinderen Machine Co., Riverfield, Mass. and the Bridge type machine built by Goody & Kilham, Inc., Portland, N. Y.

Balls and small parts are made on Grindley automatic built by the National-Armco Co., Cleveland, Ohio, and for larger bar and chucking work grinders made by James and Lammson Machine Co., Springfield, Vt. and Ames Machine Tool Co., Cincinnati, Ohio.

The drill press equipment varies from large radial drill tool Co., Cincinnati, Ohio. The necessary small chimes and other machine shop equipment are furnished with the same machine available above.

A completely equipped tool crib with metal racks manufactured by the Lane Machine Mfg. Co., Warren, Ill., which is also used for a finished and rough parts store room, contains a complete assortment of rollers, special tools, gags, and fixtures, needed for service and assembly.

Punch presses varying from a 500,000 pound machine to remove shipping machine are used to avoid hand work on sheet metal parts production.

Motor Testing Laboratory

The motor testing laboratory is exceptionally complete, the latter being separate plant and containing a dynamometer laboratory, and two small assembly rooms.

The equipment is a dynamometer dynamometer of 250 horsepower capacity. This equipment is used for tests of about 100 horsepower when dynamometer readings, fuel consumption and other tests are desired. The outside test is performed in the rear of the test laboratory building consists of torque masts equipped to perform standard Army and Navy tests and other tests of long duration.

A recovery weighing scale of an original type is used for measuring the pull on the torque arm. The actual dynamometer air pressure needed in such tests are available.

Courtesy Extended on Floor

Thanks are due to the general manager, the chief engineer, and staff for facilities offered on a visit to the factory of which the *Aviation* has very much to say. They are greatly proud of and justify the Aeromarine claim that they are attacking the commercial aviation problem by practical performance rather than by theoretical speculation.

U. S. Imports and Exports of Aircraft

Years Ending June 30, 1931-1930

Previous to 1932, when the classification "aeroplane" first appears, aircraft were included in the class "all other cars, aeroplanes, and vehicles" so that no exports are recorded. There were any importations of these machines they would be included in the classification of the paragraph of the tariff law under which the import duty was assessed, according to the chief value of component material, such as iron and steel or other metal, or manufacturers of wood, flux or silk.

Persons will recall one or two importations of balloons in 1903-5. For the international balloon race, the aerobates were brought in under bond, which was surrendered on expiration after the most successful, late and Argyle balloons would be dutiable in imports according to the component material of chief value. In the statistics they would be included in the class "all other articles."

Supplies for the American Expeditionary Force abroad which were shipped overseas in Army or Navy transports were not taken account of in the official statistics of imports from the United States for the reason that these vessels are not required to enter and clear, and collections of statistics here, therefore, are record of the cargoes of such vessels.

Military supplies and material added to the allied governments, food-stuffs, clothing and other relief supplies shipped abroad by the Food Administration and the Red Cross were mostly carried on commercial vessels and are included in the official reports of exports. Vessels operated by the United States Shipping Board, other liners or major charterers, and cleared at the custom house, and their cargoes are included in the statistics.

EXPORTS			IMPORTS		
Aircraft	Value		Aircraft	Value	
	No.	Value		No.	Value
1931	19	\$ 152,000	17	\$ 20,254	
1930	20	\$ 22,000	18	\$ 1,000	\$ 1,000
1929	4	\$ 10,000	16	\$ 1,000	\$ 1,000
1928	4	\$ 10,000	15	\$ 1,000	\$ 1,000
1927	4	\$ 10,000	14	\$ 1,000	\$ 1,000
1926	4	\$ 10,000	13	\$ 1,000	\$ 1,000
1925	4	\$ 10,000	12	\$ 1,000	\$ 1,000
1924	4	\$ 10,000	11	\$ 1,000	\$ 1,000
1923	4	\$ 10,000	10	\$ 1,000	\$ 1,000
1922	4	\$ 10,000	9	\$ 1,000	\$ 1,000
1921	4	\$ 10,000	8	\$ 1,000	\$ 1,000
1920	4	\$ 10,000	7	\$ 1,000	\$ 1,000
1919	4	\$ 10,000	6	\$ 1,000	\$ 1,000
1918	4	\$ 10,000	5	\$ 1,000	\$ 1,000
1917	4	\$ 10,000	4	\$ 1,000	\$ 1,000
1916	4	\$ 10,000	3	\$ 1,000	\$ 1,000
1915	4	\$ 10,000	2	\$ 1,000	\$ 1,000
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Western Airline Syndicate

The announcement comes from the Cincinnati Aircraft Co. that C. E. Lay formerly president of the company, who still retaining his association with that concern, is organizing a large corporation which he is to head, that of the Western Airline Syndicate.

During the past season Mr. Lay has operated eight planes in passenger and exhibition work. The planes which are said to have done almost continuous service, have landed thousands of miles entirely without accident. Mr. Lay attributes his remarkable success in operating his planes largely to the fact that he has religiously made use of the Weather Bureau reports of flying conditions. His pilots have been kept constantly posted on weather conditions and were under orders to move their planes in time to locate them in a territory where flying weather prevailed.

In an interview a few days ago Mr. Lay stated that he considered the revenue from exhibition flights and passenger carrying "Beechcrafting" virtually at an end. "What the airline must now do is rapidly scheduled service. I do not consider that it is a time yet for a full-fledged passenger service by air," he said. "We must begin with a freight service and gradually develop the passenger-carrying plane as the present equipment will not give us enough revenue but we can make good on an express line until such time as the engineer develops something for us, and said that time the passenger will have to be carried at his normal rate.

"I should prefer to maintain our base over the less hazardous flying territory, avoiding the greatest centers of population offering the shortest flights. These express lines will have an advantage in operation over my present schedule, as that these will be less water and less on equipment as we will avoid the continuous landings and take-offs making us to throttle down our engines while in the air and save them a great deal. We will not overstretch all around."

The first step in the detailed work of getting the Western Airline organization started was begun in the several cities on November 26, when M. B. Field, business manager, started soliciting business plan to operation and receive foreign that will be available for air transportation and comparing the relative costs. Chief engineer Wilber, together with Lee Shepherd, vice-president, are making an extensive trip through the middle west covering numerous runs for a factory and test fields which have been solicited by technical agents of the central districts.

Nothing definite has been accomplished along this line but it is said that an aerial location has been selected near Chicago. A new five-cylinder engine has been developed and tested out. This engine develops 130 horsepower replacing in the same equipment the present 80 horsepower power plant. Several changes will also be made in the facilities to adapt the carrying of a greater load.

Dugins's Flying School

The Ralph C. Dugins School of Flight and Commercial Aviation Co. has increased its capitalization to \$30,000 in order to carry on commercial aviation on an enlarged scale. Important changes are being made at the Dugins' Airfield in Chicago under the direction of the aviation school, in both telegraph and telephone, and the erection of a building on the field to be used as living quarters for the students. These quarters will contain a large gymnasium, equipped with comfortable beds, a dining room, shower bath, a library and necessaries to make the life of the student comfortable.

Several new courses have been added to the curriculum. The ground course consists of engine operation, assembly, disassembly, maintenance, and repair, trouble shooting, overhaul, etc. The plane work consists of assembly and disassembly, repairing, overhauling, wood, metal and wire working, maintenance, etc. A course in aerial navigation, instruments, field management and general instruction is also included.

Lessons and classroom work will be carried on during the middle of the day while the flying instruction will be given in the early morning and late in the afternoon. Class will have their planes and fly for one hour. His work is given on three types of engines, the vertical, the V-type and the rotary. During the past season this school graduated thirty-one pilots.

Aviation Activities in Portland, Ore.

With three graduate schools well established, a factory for assembling airplanes now in operation and two companies operating flying machines commercially, Portland has already assumed its place as one of the aviation centers of the northwest.

The first important move for the development of aviation there was over a year ago, when a number of prominent business men of the city organized the Oregon, Washington and Idaho Airplane Co. The Lewis & Clark field was laid out and the first flight made by a machine of the company occurred on November 4, 1924.

From that beginning, aviation rapidly developed as a feature of the life of the city. Other concerns were organized or came to the city. The city flying field, now known as Broadfield Flying Field, was laid out and fields were established at various other points in the state.

The Dudley Aircraft company was the first to see the possibilities in an educational institution for the teaching of them. The result was that the Dudley school of aeronautics was organized and a building erected on Broadfield Field, containing shops and equipment for teaching flying.

From that the work of teaching aviation in the city has rapidly developed. In addition to the Dudley school, the Oregon, Washington and Idaho Airplane Co. is now maintaining a school, and the Avion auto and gas engine school has established a department for teaching the mechanics of airplane engines. The schools already have an aggregate enrollment of over 500 pupils and there is developing throughout the northwest a growing interest in this line of work.

The course in aviation given students is quite complete. The Avion school specializes in engines and their construction and repair, the Oregon, Washington and Idaho company's school and the Dudley school take up with the construction of planes and engine and aerial flying. The Avion school also has an arrangement with the Oregon, Washington and Idaho company for teaching its students flying, if they desire that work.

The start for making Portland an airplane manufacturing center came during the month of November, when the assembly plant of the Republic Aircraft Corp. was established at East 10th and Marion streets in Portland. This concern has built a small airplane machine known as a "R-1" in the form of a biplane, a machine which is destined to be within the reach of everyone's purse. The machines are of both the monoplane and biplane types.

Airplane Patrols in Morocco

Although the life of a tourist is considered unsafe if he proceeds farther into Morocco than to the points at which the French Moroccan system active protection, according to the New York Herald Tribune, returned recently from these hills of airplane surveillance which has been instituted by General Lyatney, and which is having a strong curbing effect.

It would require a standing army of 500,000 men to suppress successfully every dangerous spot in a country where religion as well as national ambitions are constantly conflicting, yet ten air squadrons are so efficiently covering the whole territory that in the last few years the number of attacks in the interior are reduced to the insignificant figure of 30 per cent.

The work is not without its dangerous features, however, for once the war, hundreds of natives who had served in the French army engaged in secret riots and assassinations in the hills, with the result that the squadrons frequently return with their wings ridged with bullets. But these squadrons rarely break the situation of the people, and the French forces, despite casualties, are continuing their efforts to pacify the country, which has never been subjected by attack.

Constructor E. G. Ericson's House

On the cover of this issue is the Canadian home of E. G. Ericson, the well-known mechanical constructor at Vancouver, 22 miles west of Toronto. Mr. Ericson's flying field adjoins his home and from here he commutes to Toronto whenever he wishes to go to that city. Often he takes Mr. Ericson and their baby who he claims is the youngest flying passenger in aeromarine.



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